

Report Recipients:

SSC/AA00/Director,
John C. Stennis Space
Center

**WEAKNESSES IN STENNIS SPACE CENTER'S
PROCUREMENT OF
HIGH-PRESSURE VALVES**

June 27, 2003

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National Aeronautics and
Space Administration

OFFICE OF INSPECTOR GENERAL

Released by: [Alan J. Lamoreaux DAIGA] for

David M. Cushing, Assistant Inspector General for Auditing

Weaknesses in Stennis Space Center's Procurement of High-Pressure Valves

We found serious weaknesses with Stennis Space Center's (Stennis) management of a \$2.5 million contract with Dresser Equipment Group (Dresser) for 26 high-pressure valves. These valves are used to control flammable and explosive fuels at the Center's component test facility. Stennis' ineffective contract management resulted in late deliveries, increased costs, and defective valves that jeopardized test schedules for critical test articles, such as engines for the joint NASA/Air Force Integrated Powerhead Demonstrator project and NASA's 2nd Generation Reusable Launch Vehicle Program.

Stennis mismanaged this contract by allowing Stennis engineers to direct design changes to the valve specifications without Contracting Officer approval and by not requiring Dresser to submit a subcontractor plan. Additionally, Stennis did not perform required technical, safety, or quality assurance reviews. Consequently, Dresser delivered only 1 valve on time and 24 valves from 4 to 26 months late. One other valve has not yet been delivered. As of January 2003, Stennis has incurred about \$229,000 in additional costs to rework 12 valves that were accepted with known defects. Propulsion Test Directorate (PTD) personnel believed accepting and reworking the defective valves would be faster and cheaper than allowing Dresser to correct the problems. Ultimately, engine testing was delayed 2-1/2 months for the Integrated Powerhead Demonstrator project and 1 month for the 2nd Generation Reusable Launch Vehicle Program engine.

We have indications that similar problems could occur with Stennis' five other pressure system contracts (totaling \$6.2 million). Management needs to ensure that each of its pressure vessel and pressurized systems contracts are effectively managed to minimize potential safety hazards at the Center.

High-Pressure Valve Acquisition and Management Weaknesses

Unauthorized Design Changes Resulted in Additional Costs. In May 2002, the Contracting Officer's Technical Representative (COTR) notified the Contracting Officer that engineering personnel inappropriately authorized Dresser to make several changes to liquid oxygen valves that were not part of the original contract specifications. The COTR estimated that the changes would cost \$85,850. For example, after collaborating with Stennis engineers, Dresser machined concentric grooves into the valve bodies to solve fluid delivery problems during low-flow and low-pressure situations. Stennis

subsequently found that the grooves increased fluid ignition hazards in liquid oxygen systems during high-flow and high-pressure situations. The design changes contributed to delays that ultimately led Stennis to accept three valves that were incomplete or leaked excessively.

The Center accepted the three valves in an attempt to meet test schedules for the joint NASA/Air Force Integrated Powerhead Demonstrator project. Stennis then directed its facility support contractor to rework the valves, to include removing the concentric grooves, at NASA's expense. Even after being reworked, one valve continued to leak flammable liquid oxygen and was undergoing its third repair at the time of our field work.

Subcontractor Performance Resulted in Defective Valves. Dresser initially advised the Contracting Officer that it did not plan to use subcontractors except for the valve actuators and hub ends and that it had sufficient in-house capability to perform all other manufacturing work on the valves. Thus, the Contracting Officer exempted Dresser from submitting a subcontracting plan. Subsequently, Dresser used subcontractors for manufacturing work not related to the valve actuators and hub ends. However, the Contracting Officer never required Dresser to submit a subcontracting plan.

Dresser's use of additional subcontractors resulted in defective welding, improper attachment of valve vacuum jackets, and valve contamination. For example, in June 2000, Dresser notified the COTR that it planned to use a subcontractor to weld valve bodies for 6-inch and larger valves. In January 2001, Dresser notified the COTR that upper and lower valve body sections welded by that subcontractor did not meet specifications. In May 2001, Dresser notified PTD personnel, the Contracting Officer, and the COTR that it had been negotiating with a subcontractor regarding cost overruns on vacuum jackets. Appendix D, Figure 2 shows a 10-inch liquid oxygen valve being disassembled at the cleaning subcontractor's facility after tests indicated the valve was contaminated. Dresser used these subcontractors despite the early assurances to the Contracting Officer that no additional subcontracting opportunities existed. Had the Contracting Officer required a subcontracting plan, Stennis may have performed the oversight needed to ensure quality and timeliness and avoid increased costs.

Technical Specification Reviews and Approvals Not Performed. The Center's pressure systems experts and Safety and Mission Assurance officials did not review or approve the contract's technical specifications. NASA and Stennis guidance require such reviews to ensure the structural integrity of pressure system components and to minimize potential mishaps. Instead, PTD personnel developed, reviewed, and approved the specifications and Dresser's valve designs. Further, PTD personnel indicated that additional technical or safety specification reviews were unnecessary and would delay the award and manufacturing process. Completing the reviews may have identified and addressed problems with valve designs. For example, Stennis may have identified the potential hazards from using Monel versus stainless steel valve stem materials and an unacceptable method to attach vacuum jackets. Performing required reviews for future

technical specifications may save Stennis time and money if the reviews identify design problems prior to the manufacture of pressure system components.

Safety and Quality Assurance Oversight Not Performed. The Contracting Officer did not require surveillance of Dresser's performance as prescribed by the Federal Acquisition Regulation. Specifically, Stennis did not perform quality oversight or inspections of the valves during manufacture or prior to acceptance. Stennis engineers visited Dresser's manufacturing plant and two of Dresser's subcontractors, but did not inform the Contracting Officer or quality and safety personnel of the manufacturing problems observed or the resolutions agreed to with Dresser and its subcontractors. Consequently, the Contracting Officer had no basis to support adverse action against Dresser when it did not meet contract requirements.

Recommendations, Management's Response, and Evaluation of Management's Response

To correct management and acquisition control weaknesses, ensure effective management and surveillance of pressure vessel and pressurized systems contracts, and minimize potential safety hazards at Stennis, the Center Director should:

- 1. Establish a technical focal point to ensure existing and future pressure system contracts include specifications that are reviewed and approved by appropriate quality, safety, and technical experts prior to contract award.**

Management's Response . Concur. Stennis has both a Pressure Vessel/Systems Committee and a Components Working Group that is developing action plans to address how these issues will be handled in the future. In addition, the Safety and Mission Assurance Office now reviews procurements in accordance with "S&MA [Safety and Mission Assurance] Procurement Assurance Review Policy" and Stennis Purchasing Guidance. The complete text of management's response is in Appendix H.

Evaluation of Management's Response. Management's planned actions are responsive to the intent of the recommendation. The recommendation is resolved, but will remain undispositioned and open for reporting purposes until corrective actions are completed.

- 2. Direct the PTD to coordinate with Contracting Officers regarding all changes to contract terms and conditions.**

Management's Response. Concur. The Procurement Officer, in conjunction with the Propulsion Test Directorate, has initiated a series of "Procurement Roadshows" at Stennis to emphasize the appropriate procedures for effecting contractual changes. In addition, contractors must acknowledge that only the Contracting Officer can approve changes to contract terms and conditions through the issuance of a formal contract modification.

Finally, the Director, Propulsion Test Directorate will formally emphasize the importance of processing required changes through the Stennis Acquisition Management Office (see Appendix H).

Evaluation of Management's Response. The actions taken by management are responsive to the recommendation. We consider the actions sufficient to disposition the recommendation, which will be closed for reporting purposes.

3. Consider Dresser's performance on this contract before awarding the company any future contracts.

Management's Response. Concur. Documented evidence of past performance problems is included in contract records and will be used prior to the award of future contract actions. A final past performance rating will be input into the Past Performance Database System. The contractor has been notified that Stennis will conduct a meeting to address "lessons learned" associated with the conduct and performance of the contractor upon contract completion (see Appendix H).

Evaluation of Management's Response. Management's planned actions are responsive to the intent of the recommendation. The recommendation is resolved, but will remain undispositioned and open for reporting purposes until corrective actions are completed.

Stennis' General Comments on Findings. Stennis is highly conscious of the potential effects of defective hardware on safety, schedule, and cost on test project activities. To preclude safety issues, Stennis has long-standing institutionalized, rigorous procedures and processes for safe test system design, safe test operations, independent safety reviews, and comprehensive test readiness reviews. These procedures are formalized in International Organization for Standardization (ISO) 9000 certified work instructions. Stennis is confident that its end-to-end processes will continue to realize successful propulsion test work, as they have in the past.

Evaluation of Stennis' General Comments. We reviewed a number of Stennis' ISO 9000 procedures pertaining to acquisition and support for the Center's propulsion test mission. These procedures should ensure that pressure system components are safe and reliable for use in propulsion testing. However, Stennis did not apply many of the procedures to the Dresser acquisition. For example, Stennis did not apply System Level Procedure 13, "Control of Nonconforming Product," and System Level Procedure 1280-0010, "Inspection and Testing," until Center personnel had accepted the valves, noted serious manufacturing defects, and began rework efforts. After our audit, Propulsion Test Directorate personnel informed us that they are applying the ISO 9000 procedures to ongoing pressure systems (valve) acquisitions to avoid the problems encountered on the Dresser contract.

Appendices

Details related to the disposition and closure of the recommendations are in Appendix A. Among the other appendices, note that Appendix D shows examples of high-pressure valves; Appendix E summarizes the NASA and Stennis guidance for acquisition of pressure vessels and pressurized systems; Appendix F contains the status of the valve deliveries; and Appendix G summarizes the valve contract modifications.

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Acronyms Used in the Report

COTR	Contracting Officer’s Technical Representative
ISO	International Organization for Standardization
PTD	Propulsion Test Directorate
PV/S	Pressure Vessel and Pressurized Systems

Appendix A. Status of Recommendations

Recommendation No.	Resolved	Unresolved	Open/ECD*	Closed
1	X		8/15/2003	
2	X			X
3	X		8/15/2003	

* ECD – Estimated Completion Date

Appendix B. Background

In August 1999, Stennis Space Center (Stennis) awarded contract NAS13-99035 to Dresser Equipment Group to acquire high-pressure valves for use at its component test facility. The valves are critical components of pressure systems that control liquid hydrogen, liquid oxygen, gaseous hydrogen, and gaseous nitrogen used in testing rocket engines at Stennis. The combination of system pressure, volume, and volatile fluids can create potential safety hazards, such as spills, explosions, flying debris, fires, and asphyxiation that can harm personnel and the surrounding environment. The primary NASA customer for the valves was the Stennis Propulsion Test Directorate (PTD). The PTD acquired the valves for a joint Air Force/NASA experimental engine project (the Integrated Powerhead Demonstrator) and the 2nd Generation Reusable Launch Vehicle Program.

The PTD's mission is to provide safe, efficient, and responsive rocket propulsion test services to NASA, other Government agencies, and the commercial propulsion development community. These services include testing and flight certifying rocket propulsion systems for the Space Shuttle and future generation space vehicles at the Center's three major test complexes. The PTD is responsible for managing Stennis' pressurized vessel and pressurized systems program assets. The PTD relies on a team consisting of a Pressure Systems Manager, a Pressure Systems Committee, and other experts to ensure proper management, control, and oversight of the pressurized systems program.

Appendix C. Objectives, Scope, and Methodology

Objectives

The overall audit objective was to evaluate Stennis Space Center (Stennis) controls over pressure vessels and pressurized systems (PV/S). The specific objective related to this report was to assess the Center's controls for PV/S acquisitions. The remaining objectives related to the audit were to evaluate the:

- controls for certifying and maintaining PV/S and
- oversight of contractor safety programs for PV/S.

We will address those objectives in a subsequent report.

Scope and Methodology

We reviewed Federal, NASA, and Stennis regulations, policies, and guidance related to the acquisition of PV/S. We interviewed representatives from the Propulsion Test Directorate, Center Operations, Procurement Directorate, Safety and Mission Assurance Office, Defense Contract Management Agency, and the Stennis facilities operations support contractor. We reviewed contract NAS13-99035 and related files and correspondence. We did not rely on computer-processed data during the audit.

Management Controls Reviewed

We identified and assessed the controls for reviewing, approving, acquiring, and accepting PV/S. The controls are outlined in the Federal Acquisition Regulation, the NASA Safety Policy and Requirements Document (replaced by the NASA Safety Manual¹), the NASA Safety Policy for PV/S, and the Stennis Guide for Certifying PV/S.

We considered the lack of oversight and the noncompliance with procurement and safety requirements for the valve acquisition to be management control weaknesses. By ensuring that PV/S acquisitions receive required review and approval, all changes to contract specifications are approved by the Contracting Officer, and appropriate contract surveillance and quality assurance is assigned to future contracts, Stennis can mitigate many of the problems we found with this acquisition.

Audit Field Work

We performed audit field work at Stennis from March 2002 through February 2003 in accordance with generally accepted Government auditing standards.

¹ The Agency issued NASA Procedures and Guidelines 8715.3, the NASA Safety Manual, on January 24, 2000.

Appendix D. Examples of High-Pressure Valves and Components

Figures 1 and 2 show two of the valves Stennis procured and their major components.

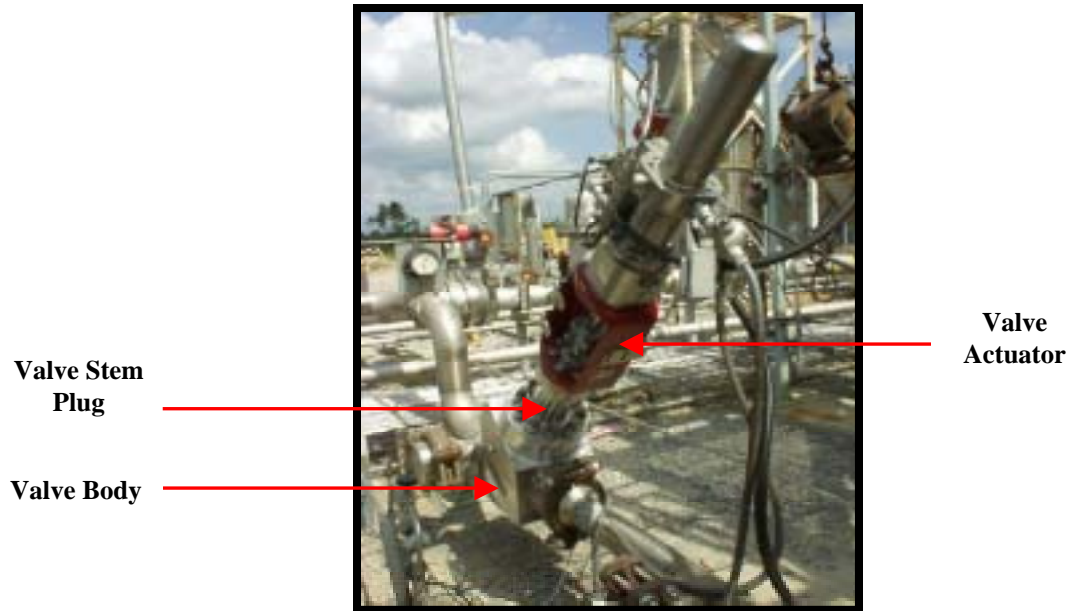


Figure 1. A 3-inch valve installed at the Stennis component test facility.

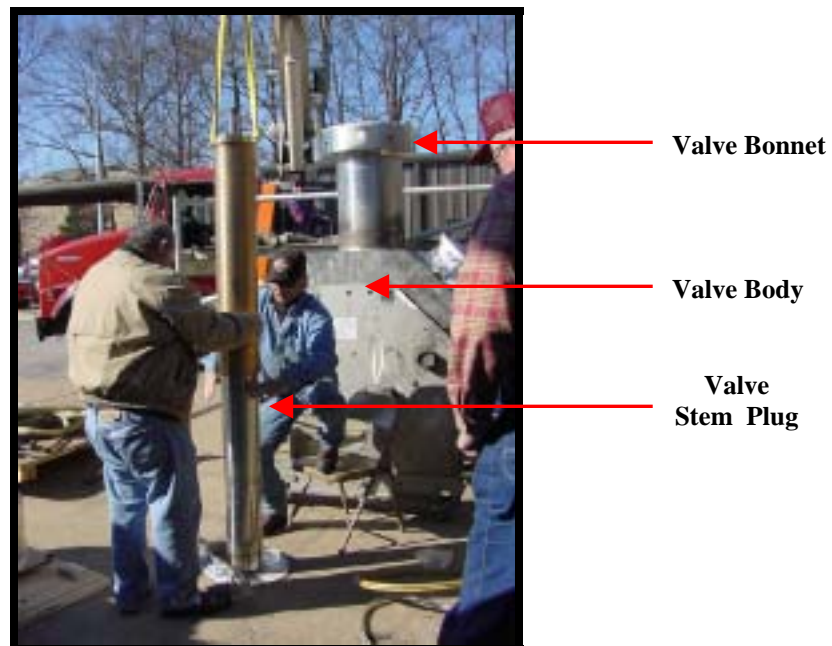


Figure 2. A 10-inch liquid oxygen valve being disassembled after tests indicated the valve was contaminated. The photograph shows the removal of the valve stem plug from the valve body.

Appendix E. NASA and Stennis Guidance for Pressure Vessel and Pressurized Systems Acquisitions

The Federal Acquisition Regulation establishes policy and procedures for acquisitions by NASA and other executive agencies. Additionally, NASA and Stennis Space Center (Stennis) have policies for the acquisition of pressure vessels and pressurized systems (PV/S). NASA Handbook 1700.1, “NASA Safety Policy and Requirements Document,” June 1, 1993, and NASA Policy Directive 8710.5, “NASA Safety Policy for PV/S,” March 17, 1998, establish the safety requirements for PV/S acquisitions.

Federal Acquisition Regulation

Part 46 of the Federal Acquisition Regulation establishes the contract quality requirements for Government contracts. Specifically, Section 46.105 establishes quality criteria for contractors and subcontractors, while 46.203 provides criteria for determining the extent of required contractor inspections. The technical description, complexity, and criticality of the purchased item determine which inspections are required. Section 46.203 of the Regulation defines complexity and criticality as follows:

- **Complexity.** Complex items have quality characteristics, not wholly visible in the end item, for which contractual conformance must be established progressively through precise measurements, tests, and controls applied during purchase, manufacture, performance, assembly, and functional operation either as an individual item or in conjunction with other items.
- **Criticality.** A critical application of an item is one in which the failure of the item could injure personnel or jeopardize a vital agency mission.

The high-pressure valves that Stennis ordered were complex and critical.

NASA Guidance

NASA Handbook 1700.1, “NASA Safety Policy and Requirements Document.” The Handbook preceded the NASA Safety Manual² and established safety requirements for support operations contracts. The Handbook further established roles and responsibilities for program and project managers, Contracting Officers, and safety and mission assurance personnel.

- Program and project officials were required to (1) review procurement documentation for safety requirements, (2) coordinate with the cognizant safety

² See footnote 1.

Appendix E

- officials to determine and approve safety requirements and objectives under which the contract would be performed, and (3) perform required checks and inspections of contractor compliance.
- Contracting Officers were required to consider using contract administration services personnel to monitor contractor safety operations.
 - Safety and mission assurance officials were required to (1) conduct safety program reviews of the contractor's operation or product; (2) ensure safety participation in critical reviews, such as hardware design reviews and design certification reviews; and (3) coordinate safety surveillance requirements of contractor operations with the Defense Contract Management Command (when delegated).

NASA Safety Policy for PV/S. The Safety Policy for PV/S provides the requirements for ensuring the structural integrity of PV/S and minimizing potential mishaps. The policy outlines PV/S-related responsibilities for Pressure Systems Committees and Pressure Systems Managers.

- Pressure Systems Committees, when required by management, may be appointed by Center Directors to, among other assignments, conduct reviews, provide guidance, and recommend requirements. The Committee shall be cognizant of PV/S design, fabrication, repair, and construction activities.
- The Pressure Systems Manager is responsible for approving PV/S designs and providing technical expertise for all matters involving PV/S.

Stennis Guidance

The Stennis Guide for Certifying PV/S, February 2002, identifies the following responsibilities.

- The Pressure Systems Manager is responsible for procurement of new pressure vessels and approval of all new designs of pressure vessels including designs performed by the Pressure Systems Design Engineer.
- The Pressure Systems Design Engineer is responsible for designing or approving the design of new PV/S and determining that all PV/S are of the correct design for operating service.

- The Pressure Systems Material Engineer is responsible for assisting the Pressure Systems Manager in reviewing procurement, design, and modification of pressure vessels.
- The Pressure Systems Committee's responsibilities include assisting the Pressure Systems Manager in reviewing procurement, design, and modification of pressure vessels.

Appendix F. Status of Valve Deliveries

Valve Number	Original Scheduled Delivery Date	Date Received	Valve Status as of January 24, 2003
Base Contract (19 valves)			
PCV-10G13-GH	8/12/00	9/30/02	Dresser delivered valve to Stennis 25 months late.
PCV-10G26-GN	8/12/00	Installed at test stand E-2 of the Component Test Facility 1/15/02	Dresser delivered the valve 17 months late, and it did not require Stennis rework.
PCV-10G27-GN	8/12/00	6/24/02	Dresser delivered the valve 22 months late, and it did not require Stennis rework.
VPV-10F11-LH	8/12/00	12/14/01	Dresser delivered the valve 4 months late, and it was 1 of 12 requiring Stennis rework.
VPV-10F12-LH	8/12/00	9/10/01	Dresser delivered the valve 12 months late, and it was 1 of 12 requiring Stennis rework.
VPV-10F13-LH	8/12/00	9/10/01	Dresser delivered the valve 12 months late, and it was 1 of 12 requiring Stennis rework.
VPV-10F14-LO	8/12/00	3/29/01	Dresser delivered the valve 7 months late, and it was 1 of 12 requiring Stennis rework.
VPV-10F15-LO	8/12/00	3/28/01	Dresser delivered the valve 7 months late, and it did not require Stennis rework.
VPV-10F17-LO	8/12/00	5/17/02	Dresser delivered the valve 20 months late, and it was 1 of 12 requiring Stennis rework.
VPV-10F18-LO	8/12/00	Returned to Stennis 1/31/02	Dresser delivered the valve 17 months late, and it was 1 of 12 requiring Stennis rework. The valve is undergoing a third rework at Stennis.
VPV-10F20-LO	8/12/00	6/18/01	Dresser delivered the valve 10 months late, and it did not require Stennis rework.
VPV-10F21-LH	8/12/00	10/18/02	Dresser delivered the valve 26 months late.
VPV-10F22-LO	8/12/00	6/12/01	Dresser delivered the valve 10 months late, and it was 1 of 12 requiring Stennis rework.
VPV-10F23-LH	8/12/00	2/17/02	Dresser delivered the valve 17 months late, and it did not require Stennis rework.
VPV-10F24-LH	8/12/00	9/10/01	Dresser delivered the valve 12 months late, and it did not require Stennis rework.
VPV-10F25-LH	8/12/00	9/10/01	Dresser delivered the valve 12 months late, and it was 1 of 12 requiring Stennis rework.
VPV-10F26-LO	8/12/00	6/12/01	Dresser delivered the valve 10 months late, and it was 1 of 12 requiring Stennis rework.
VPV-10F28-LH	8/12/00	2/17/02	Dresser delivered the valve 17 months late, and it was 1 of 12 requiring Stennis rework.

Appendix F

Valve Number	Original Scheduled Delivery Date	Date Received	Valve Status as of January 24, 2003
VPV-10F29-LO	8/12/00	2/17/02	Dresser delivered the valve 17 months late, and it was 1 of 12 requiring Stennis rework.
Option One (4 valves)			
VPV-10F16-LO	8/12/00	3/28/01	Dresser delivered the valve 7 months late, and it did not require Stennis rework.
VPV-10F19-LH	8/26/01	3/20/02	Dresser delivered the valve 7 months late, and it did not require Stennis rework.
VPV-10F27-LO	8/26/01	6/10/02	Dresser delivered the valve 10 months late, and it was 1 of 12 requiring Stennis rework.
VPV-10F30-LO	8/26/01	8/23/01	Dresser delivered the valve on time, and it did not require Stennis rework.
Option Two (3 valves)			
VPV-10F31-LO	8/26/01	Not Received	Dresser is in the process of cleaning and testing the valve.
VPV-10F32-LO	12/4/01	10/24/01	Dresser delivered the valve 10 months late, and it did not require Stennis rework.
VPV-10F33-LO	8/26/01	3/28/01	Dresser delivered the valve 5 months late, and it did not require Stennis rework.

Appendix G. Summary of Contract Modifications

Number	Date	Value	Summary
1	12/8/99	+\$491,770	The modification provided incremental funding of \$491,770 and fully funded the contract (total of \$1,726,770).
2	12/20/99	-\$5,329	The modification decreased the price of a 2-inch liquid oxygen valve shown under Option 1 by \$5,329. The modification had no impact on the funded value of the contract.
3	1/7/00	+\$54,603	Stennis purchased the 2-inch liquid oxygen valve identified in modification 2 (Option 1) for \$54,603, increasing the total contract price to \$1,781,373.
4	2/16/00	+\$670,065	Stennis exercised Option 2 of the contract and purchased an additional six valves, bringing the total contract value to \$2,451,438. Delivery of five of the valves was scheduled for 190 days after the receipt of order, and delivery of the sixth valve was scheduled for 270 days after receipt of order.
5	9/5/00	\$0	The modification extended delivery dates for valves ordered on the original award and Option 1 to November 30, 2000. The modification extended the delivery date for items purchased under Option 2 to January 31, 2001. The modification stated that the extensions were “. . . due to material changes in the Contract Specifications.”
6	12/13/00	\$0	The modification changed the valve stem/plug material from Monel K500 to stainless steel for 6-, 8-, and 10-inch valves and required the installation of a specific actuator in the additional valves purchased under Options 1 and 2.
7	1/31/01	+\$74,354	The modification changed two 3-inch valves from “fail in place” to “fail closed” and changed the valve stem material on liquid hydrogen and liquid oxygen valves from Monel K500 to 316L stainless steel. The modification also increased the total contract price to \$2,525,792 and extended the delivery date for the valves to May 23, 2001.
8	5/22/01	\$0	The modification extended the delivery dates of various valves. The dates ranged from June 30 to October 31, 2001.
9	6/12/01	+\$8,105	The modification required Dresser to provide a stainless steel close-out ring on the vacuum jacket and to provide a vacuum seal on nine of the valves. The modification also extended the delivery date for a 2-inch and 1-inch valve to July 27, 2001, and increased the contract price to \$2,533,897.
10	10/19/01	\$0	The modification deleted the cryogenic seat leakage test in exchange for Dresser’s performing ambient testing on each valve and formalizing and providing the finite element analyses to NASA.
11	12/10/01	\$0	The modification extended the delivery date for nine valves to February 8, 2002.

Appendix G

Number	Date	Value	Summary
12	12/18/01	\$0	The modification allowed for valves of differing physical configurations (the contract required identical valves) as long as they met technical specifications.
13	1/25/02	\$0	The modification provided for acceptance of a 6-inch valve that did not comply with contract specifications. The valve, shipped at Dresser's expense to Stennis, was used for final piping installation and initial liquid nitrogen cold flows for 8 weeks at test stand E-1 of the component test facility. The valve was then to be returned to Dresser, at its expense, to be reworked and to undergo final testing. Once the valve complied with contract specifications, it was to be reshipped to Stennis, and Stennis was to pay the original invoice price for the valve. The original warranty period was not to go into effect until Stennis received a valve that complied with contract specifications. The modification also extended the contract until May 10, 2002.
14	2/15/02	-\$9,966	The modification specified credit terms and conditions for NASA's acceptance of three 6-inch valves for Stennis' on-site repair. Dresser was to ship the valves to Stennis in an "as is" condition for repair and cleaning. Although the valves did not meet seat leakage standards and were not cleanliness certified, NASA accepted them with the stipulation that Dresser provide, at no cost to NASA, critical dimension drawings showing tolerances and detail of critical parts, loan a stud tensioning device and assembly fixture as needed, provide new soft goods, and provide a serviceman and engineer to assist in reassembling the valves. One of the valves was not shipped back to the contractor for rework as stated in modification 13, but remained at Stennis for rework in exchange for a credit of \$3,322 per valve (\$9,966) total. The contract value was reduced to \$2,523,931.
15	2/27/02/02	-\$5,256	The modification provided for shipment, at Dresser's expense, of a 3-inch liquid hydrogen valve to Stennis in an "as is" condition for repair and cleaning. The vacuum jacket and cleaning requirements for the valve were waived. The modification also provided for Dresser to ship an additional set of soft goods for use in reassembly and issue a credit invoice to NASA for \$5,256. The contract value was reduced to \$2,518,675.

Appendix G

Number	Date	Value	Summary
16	5/10/02	-\$5,811	The modification provided credit terms for accepting a 10-inch liquid oxygen valve for Stennis' on-site repair and extended the period of performance. Dresser, at its expense, was to ship the valve to Stennis in an "as is" condition for repair and cleaning. The valve body, actuator, stem plug, and soft goods were then to be shipped to Stennis as soon as possible, but not later than May 15, 2002. Dresser was also to loan a test plug for proof testing. The period of the contract was extended to July 26, 2002, and Dresser was to issue NASA a credit for \$5,811 and provide tools valued at \$42,404. The contract value was reduced to \$2,512,864.

Appendix H. Management's Response

National Aeronautics and
Space Administration
John C. Stennis Space Center
Stennis Space Center, MS 39529-6000



May 7, 2003

Reply to the AAO: AA00

TO: Office of the Inspector General
Attn: W/Assistant Inspector General for Auditing

FROM: AAOO/Director

SUBJECT: Draft Audit Report, Assignment Number A-02-020-00
Weaknesses in Stennis Space Center's Procurement of High Pressure Valves

Thank you for the opportunity to provide comments on the subject draft audit report. We do not disagree with the ultimate finding that NASA/SSC could have done a better job in managing contract NAS13-99035 with Dresser Equipment Group as well as the configuration control of the changes directed by the Government's technical representative(s) assigned as technical managers under the contract. We also concur in the fact that several changes were directed to the contract specifications without the knowledge and approval of the contracting officer and that the contractor responded to these unauthorized changes, despite the fact that the contractor was given a letter upon contract award notifying him that "In no case should you proceed with any change in the contract requirements that may increase the value of the contract. Changes that increase the value or scope of the contract require a modification to the contract".

The following addresses the recommendations provided in your audit report no. A-02-020-00, as follows:

- 1. Establish a technical focal point to ensure existing and future pressure system contracts include specifications that are reviewed and approved by appropriate quality, safety, and technical experts prior to contract award.**

Response:

- a. Stennis has both a Pressure Vessel/Systems Committee and a Components Working Group and they are developing action plans to address these issues and how they will be handled in the future. Action plans to be developed by August 15, 2003. A focal point will be appointed no later than June 1, 2003.
- b. The SSC S&MA Office is now being afforded a review on all existing and future procurements that meet the criteria noted in SPD 8730.3

Appendix H

**"S&MA Procurement Assurance Review Policy" and SLP-06 "Purchasing".
Action implemented.**

- 2. Direct the PTD to coordinate with contracting officers regarding all changes to contract terms and conditions.**

Response:

- a. The Procurement Officer, in conjunction with the Director, Propulsion Test Directorate, has initiated a series of "Procurement Roadshows" to the Propulsion Test Directorate, as well as other organizations at Stennis, to address issues such as changes to contractual requirements. We have conducted several of these over the past year and will continue to emphasize the appropriate procedures for effecting contractual changes. Action ongoing throughout the calendar year. Several have already been conducted. Action implemented.
- b. The Contracting Officer Technical Representative (COTR) Delegation letter has been amended which requires the contractor to acknowledge receipt of the same that any change that impacts the contract cost, scope or other terms and conditions, shall be approved by the contracting officer through issuance of a formal modification to the contract before the contractor progresses with the changed work. Action implemented.
- c. The Director, Propulsion Test Directorate will formalize previous email correspondence to his employees reiterating the importance of processing required changes through the Acquisition Management Office. Action to be completed by May 15, 2003.

- 3. Consider Dresser's performance on this contract before awarding the company any future contracts.**

Response:

- a. In prior past performance ratings, documented evidence of performance problems is included in the contract records and we will use this information prior to the award of future contract actions. Final past performance rating to be input into the Past Performance Database Action to be completed by August 15, 2003.
- b. The contractor has been notified that we expect to conduct a meeting to address "lessons learned" associated with the conduct and performance of this contract upon completion of contract NAS13-99035. Action to be completed by August 15, 2003.

To the best of our knowledge and belief, the NASA contracting officer complied fully with Federal and NASA Procurement regulations regarding safety and quality assurance oversight based upon the knowledge he had of the items being purchased. At the time of award, the contract was executed with commercial terms and conditions and provided for inspection and acceptance clauses appropriate to a commercial item acquisition. As the contract progressed, it became apparent that the item was not of a commercial nature, but more of an R&D nature.

With respect to subcontractor performance resulting in defective values, there were numerous instances of documented evidence whereby we obtained consideration in the form of monetary credits, special tooling, certifications and soft goods, from the contractor for the delays and non-conformances experienced. Also with regard to the subcontracting plan, while no subcontracting plan was included in the contract file, the contracting officer's subcontracting plan exemption did not prohibit Dresser from using other subcontractors; however, they should have provided formal notification to the Government when they opted to do so. The ultimate goal of this contract was to have the contractor deliver the product in accordance with the terms and conditions of the contract, and as they progressed, it became apparent that they required use of additional subcontractors to meet this goal.

A general note on technical risk reduction is also warranted. SSC is highly conscious of the potential impacts of defective hardware on safety, schedule, and cost on our test project activities. To preclude safety issues, SSC has long-standing, institutionalized rigorous procedures and processes for safe test system design, safe test operations, independent safety reviews, and comprehensive test readiness reviews that include the test customers. These are formalized in ISO 9000 certified work instructions for the range of test and test-related activities by the NASA contractor team. We are confident that our end-to-end processes will continue to realize successful propulsion test work, as they have in the past.

The cooperation of your team in assisting NASA/SSC in identifying these issues and strengthening our procurement and project management procedures with regard to future procurement actions of this nature is sincerely appreciated. If we can be of further assistance, to you or your staff, do not hesitate to contact the NASA/SSC Procurement Officer, Rebecca Dubuisson at (228) 688-1636 or Robert Lightfoot, Director, Propulsion Test Directorate at (228) 688-2225.

for MURGL

W. W. Parsons

Appendix H

cc:
BA00/Ms. Benigno
BA10/Ms. Mosteller
BA30/Ms. Dubuisson
BA31/Mr. Huk
QA00/Mr. Smiles
RA00/Mr. Rodriguez
VA00/Mr. Lightfoot
VA00/Mr. Rahman

Appendix I. Report Distribution

National Aeronautics and Space Administration Headquarters

A/Administrator
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ADT/Associate Deputy Administrator for Technical Programs
AA/Chief of Staff
AB/Associate Deputy Administrator
B/Deputy Chief Financial Officer for Financial Management
B/Deputy Chief Financial Officer for Resources (Comptroller)
BF/Director, Financial Management Division
G/General Counsel
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JSC/AA/Director, Johnson Space Center
KSC/AA/Director, John F. Kennedy Space Center
LaRC/106/Acting Director, Langley Research Center
MSFC/DA01/Director, George C. Marshall Space Flight Center
SSC/AA00/Director, John C. Stennis Space Center

Appendix H

Non-NASA Federal Organizations and Individuals

Assistant to the President for Science and Technology Policy
Deputy Associate Director, Energy and Science Division, Office of Management and Budget
Branch Chief, Science and Space Programs Branch, Energy and Science Division, Office of Management and Budget
Managing Director, Acquisition and Sourcing Management Team, General Accounting Office
Senior Professional Assistant, Senate Subcommittee on Science, Technology, and Space

Chairman and Ranking Minority Member – Congressional Committees and Subcommittees

Senate Committee on Appropriations
Senate Subcommittee on VA, HUD, and Independent Agencies
Senate Committee on Commerce, Science, and Transportation
Senate Subcommittee on Science, Technology, and Space
Senate Committee on Governmental Affairs
House Committee on Appropriations
House Subcommittee on VA, HUD, and Independent Agencies
House Committee on Government Reform
House Subcommittee on Government Efficiency and Financial Management
House Subcommittee on Technology, Information Policy, Intergovernmental Relations, and the Census
House Committee on Science
House Subcommittee on Space and Aeronautics, Committee on Science

Congressional Member

Honorable Pete Sessions, U.S. House of Representatives

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Report Title: Weaknesses in Stennis Space Center's Procurement of High Pressure Valves

Report Number: _____ **Report Date:** _____

CIRCLE THE APPROPRIATE RATING FOR THE FOLLOWING STATEMENTS.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	N/A
1. The report was clear, readable, and logically organized.	5	4	3	2	1	N/A
2. The report was concise and to the point.	5	4	3	2	1	N/A
3. We effectively communicated the audit objectives, scope, and methodology.	5	4	3	2	1	N/A
4. The report contained sufficient information to support the finding(s) in a balanced and objective manner.	5	4	3	2	1	N/A

Overall, how would you rate the report?

- Excellent Fair
 Very Good Poor
 Good

If you have any additional comments or wish to elaborate on any of the above responses, please write them here. Use additional paper if necessary. _____

How did you use the report? _____

How could we improve our report? _____

How would you identify yourself? (Select one)

- | | |
|---|--|
| <input type="checkbox"/> Congressional Staff | <input type="checkbox"/> Media |
| <input type="checkbox"/> NASA Employee | <input type="checkbox"/> Public Interest |
| <input type="checkbox"/> Private Citizen | <input type="checkbox"/> Other: _____ |
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May we contact you about your comments?

Yes: _____ **No:** _____

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Thank you for your cooperation in completing this survey.

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